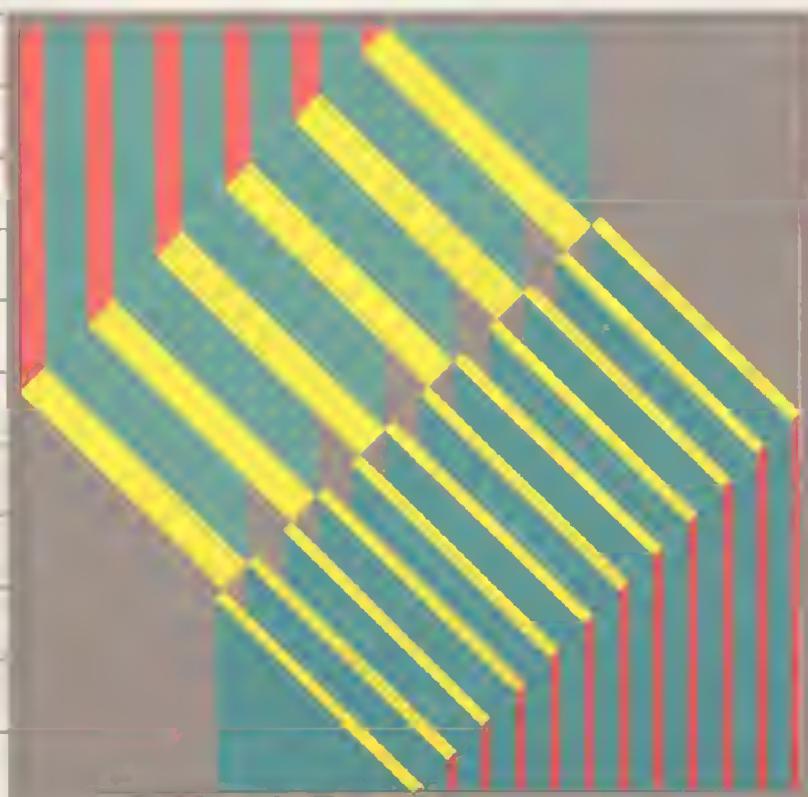


**Apple II**

**80-Column Text Card Manual**

For IIe Only



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Written by Susan Meade of the Apple PCSD  
Publications Department

## **Warning**

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

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**Apple II**

80-Column Text Card Manual



## Radio and Television Interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly, that is, in strict accordance with our instructions, it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if you use a "rabbit ear" television antenna. (A "rabbit ear" antenna is the telescoping-rod type usually contained on TV receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

- Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Apple peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.
- Move the computer to one side or the other of the TV or radio.
- Move the computer farther away from the TV or radio.
- Plug the computer into an outlet that is on a different circuit than the TV or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission:

*"How to Identify and Resolve Radio-TV Interference Problems"*

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock number 004-000-00345-4.



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## *About This Manual*

This manual explains how to install and activate the Apple IIe 80-Column Text Card and provides instructions on how to use it with your particular operating system. This manual assumes you have unpacked and set up your Apple IIe and have read the *Apple IIe Owner's Manual* that came packed in the box with your computer. If you haven't read your copy yet, please do so to introduce yourself to the insides of the computer and the terminology associated with it before reading further in this manual.

### **Purposes of This Manual**

This manual has five purposes:

- To aid you in the correct installation of your Apple IIe 80-Column Text Card.
- To guide Pascal, CP/M, and BASIC users through the steps necessary to activate the 80-Column Text Card.
- To explain how the addition of the 80-Column Text Card affects some of the Apple IIe display features.
- To introduce features and functions available to Apple IIe BASIC users with the addition of the 80-Column Text Card.
- To direct you to sections in other manuals that pertain to the operation of the 80-Column Text Card.

## Aids to Understanding

Computer jargon and words with which you may be unfamiliar are italicized throughout this manual. All italicized words are defined in the Glossary, Appendix C.

Look for these visual aids through the manual:

- By the Way gray boxes contain useful or interesting pieces of information.
- Warning boxes indicate potential problems or disasters.
- Notes in the margins reinforce new terms or point to useful information contained in other manuals.

## Further Reading

For more information, you may also want to read or refer to the following manuals:

- The *Applesoft BASIC Programmer's Reference Manual* is designed for Apple IIe users who have some programming experience. It serves as a complete reference manual on the Applesoft BASIC language and provides an introduction to program planning, layout, and design.
- The *Applesoft Tutorial* is a guide for beginning BASIC programmers. It provides step-by-step guidance for the new programmer and has a special chapter on editing Applesoft BASIC programs.
- The *Apple IIe Reference Manual* tells you how the Apple IIe works and contains a great deal of information about the technical aspects of the system's operation.

## ***Introduction***

---

- 4 System Requirements
- 5 Using Software Developed for the Apple II and II-Plus
- 5 How Much of This Manual Do I Need To Read?



## Introduction

The 80-Column Text Card for the Apple IIe computer is a *peripheral card* that gives your *display device* 40 extra characters per line and makes some new features available to BASIC users. The standard Apple IIe displays up to 40 columns of text on the video screen. The 80-Column Text Card enables the Apple IIe to display up to 80 columns of text on the standard 24-line screen. It also permits switching back and forth easily between 40- and 80-column displays.

Figure 1-1. 40- and 80-Column Displays

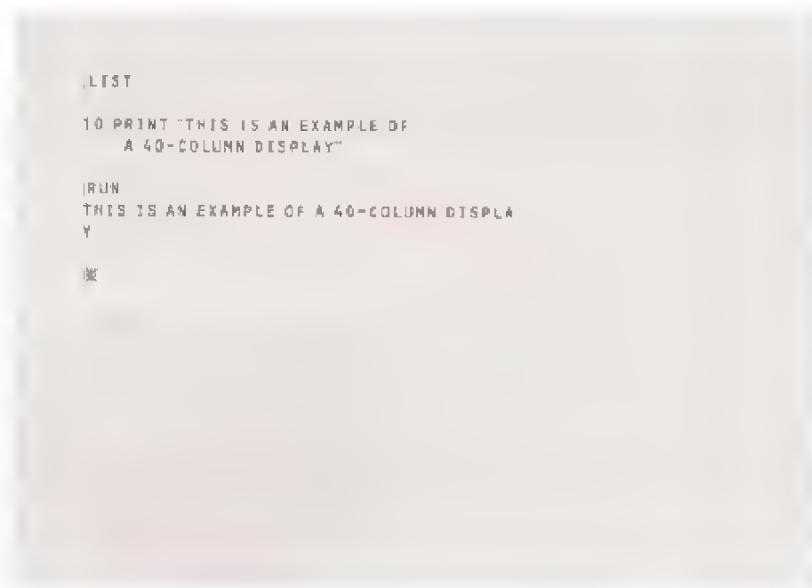
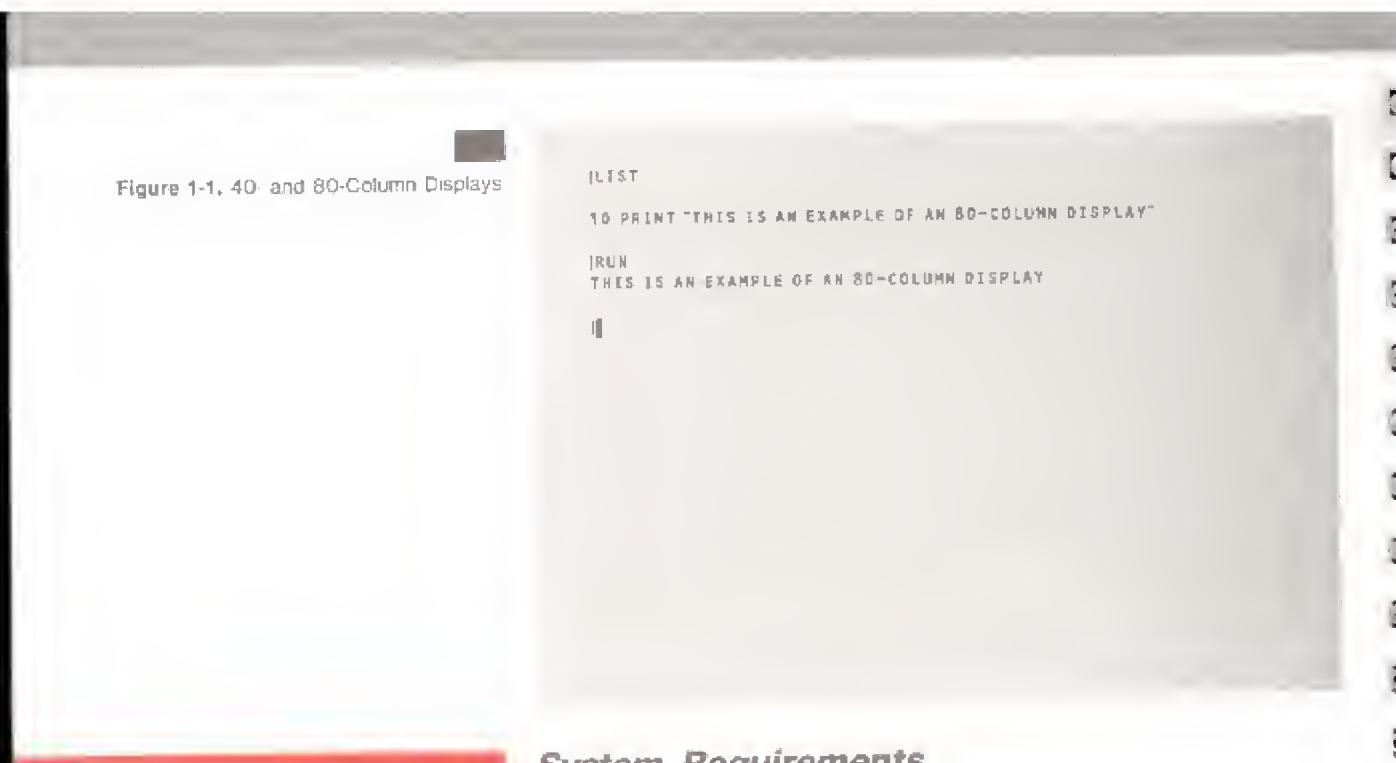


Figure 1-1. 40- and 80-Column Displays



```
|LIST
10 PRINT "THIS IS AN EXAMPLE OF AN 80-COLUMN DISPLAY"
|RUN
THIS IS AN EXAMPLE OF AN 80-COLUMN DISPLAY
```

## System Requirements

The 80-Column Text Card is designed specifically for the Apple IIe 64K computer with its *auxiliary slot* (labeled **AUX. CONNECTOR**). This card cannot be used with the Apple II and II-Plus computers, which do not contain this special built-in slot. In the Apple II and II-Plus computers, expansion slot 3 was conventionally used for *80-column text cards*. Although there is also a slot 3 inside the Apple IIe, the auxiliary slot effectively replaces and renders this slot inoperable when the Apple IIe 80-Column Text Card is installed.

**By the Way:** Do not install a peripheral card in slot 3 while the 80-Column Text Card is in the **AUX. CONNECTOR** slot. If you install cards in both slots, nothing will be damaged, but the card in slot 3 won't work.

Television sets lack the capability to display 80 columns of text clearly, so you must use a black-and-white video monitor rather than a television set while displaying 80 columns of text. If you want to use a color television set with your Apple IIe (to do color graphics, for instance) while the 80-Column Text Card is installed, you can do so as long as you've switched back to a 40-column display. You will read more about switching back and forth between 40- and 80-column displays in Chapter 4.

## Using Software Developed for the Apple II and II-Plus

A lot of available software was designed for earlier versions of the Apple II computer and thus does not take advantage of some Apple IIe capabilities. For instance, some software may not use the **UP**- and **DOWN-ARROW** keys and lowercase capability of the Apple IIe. Also, software designed for the 40-column display of the Apple II or II-Plus won't take advantage of the Apple IIe's 80-column capability. Most of this software will work just fine on your Apple IIe, but just won't magically switch the display to 80 columns.

## How Much of This Manual Do I Need To Read?

Different computer users want and need different kinds of information from manuals. You may only need to find out how to install the card, or you may want to know all the differences between 40- and 80-column screen displays. The following chart shows which topics are covered in which chapters, so you can pick and choose those chapters that interest you.

Topic Covered	Chapters							
	1	2	3	4	5	6	7	8
Installation instructions					X			
Activating the Apple IIe 80-Column Text Card						X		
Deactivating the Apple IIe 80-Column Text Card and switching between 40- and 80-column displays						X		
Features available to BASIC users			X	X	X	X		
Features available to Pascal users							X	
40- and 80-column display differences						X		
Escape features							X	
<b>CONTROL</b> -character functions								X
Pointers to the <i>Apple IIe Reference Manual</i>								X



## *Installing the Text Card*

---

- 9 The Apple IIe 80-Column Text Card
- 10 Inside the Apple IIe
- 11 Correct Card Position
- 12 A Correctly Installed 80-Column Text Card



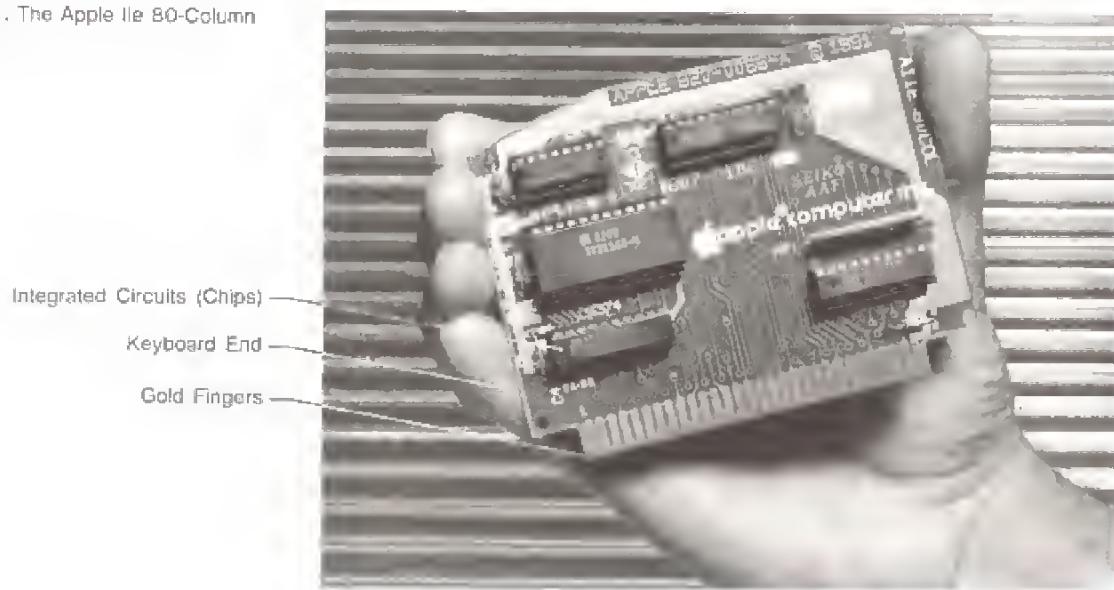
## Installing the Text Card

It's easy to install the Apple IIe 80-Column Text Card in your computer in only a few minutes. Read the following directions and do as they say, step by step. Be sure to fill out the warranty card that comes packed in the box with your 80-Column Text Card (if you have not already done so).

**By the Way:** The Apple IIe 80-Column Text Card consists of only one part, the printed circuit card that contains five *integrated circuits* (or silicon chips). The *chips* on the card have the simple task of storing the extra 40 columns of characters. The characters are stored there by the *firmware* built into your Apple IIe's *read-only memory (ROM)*. If you are interested, you can learn more about the firmware in the *Apple IIe Reference Manual*.

Take the 80-Column Text Card out of its protective plastic bubble wrap and put it on the table in front of you, chip side up, as shown in Figure 2-1.

Figure 2-1. The Apple IIe 80-Column Text Card



Look at the card and notice that one side is marked KEYBOARD END. This is the side that will be nearest the keyboard when the card has been installed. Along the bottom edge of the card is a row of gold fingers (no relation to James Bond). This is the edge that you will insert in the auxiliary slot inside your Apple IIe. Do not touch the gold fingers; moisture left by your hands will attract dust that can cause a bad connection.

Figure 2-2. Inside the Apple IIe Main Logic Board



1. Before you do anything else, make sure you turn the power off on your Apple IIe.

#### Warning

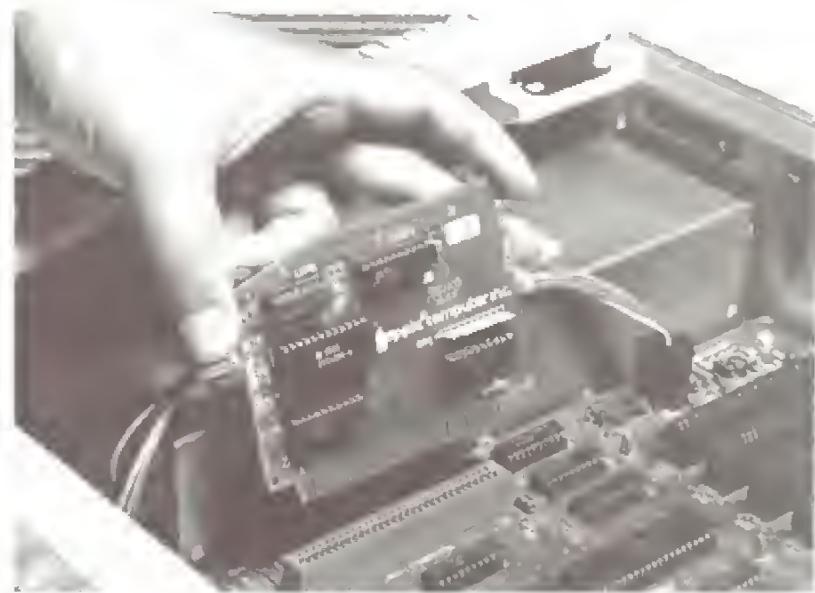
It is essential that you turn off the Apple IIe's power before installing or disconnecting anything. This prevents possible damage not only to the circuits of your IIe and the 80-Column Text Card but also to yourself.

2. Remove the cover from your Apple IIe by pulling up on the rear edges until the cover pops off. Slide the cover away from the keyboard and put it in a safe place for a few minutes.
3. Touch the power supply cover (the big gold or silver box) to discharge any static electricity you may be carrying on your clothes or body.
4. Check inside the Apple IIe to be sure the little red light in the back isn't glowing. If it is, the power is on. This light provides an extra warning, helpful if you get interrupted in the middle of installing something or are particularly absent-minded.

5. Find the auxiliary slot inside your Apple IIe. This slot is labeled **AUX. CONNECTOR**. When the keyboard is facing you, the slot is located on the left side of the *main logic board* next to the power supply.
6. Pick up the 80-Column Text Card and, holding it carefully without touching the gold fingers, check to make sure the edge labeled **KEYBOARD END** is indeed pointing toward the keyboard. In the correct position the chips should be facing away from the power supply.

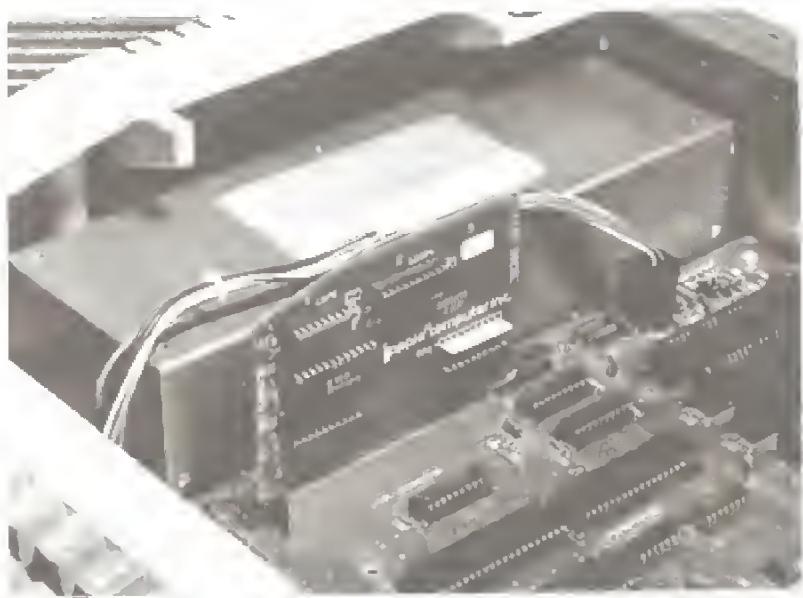
**By the Way:** If you install the card backward, the 80-column display won't work, but you can't damage the computer or the card by improper installation.

Figure 2-3. Correct Card Position



7. Position the 80-Column Text Card over the auxiliary slot. Put a thumb on the top edge of the card, rock it gently back and forth to get it started, then press down firmly until the card is fully seated.

Figure 2-4. A Correctly Installed 80-Column Text Card



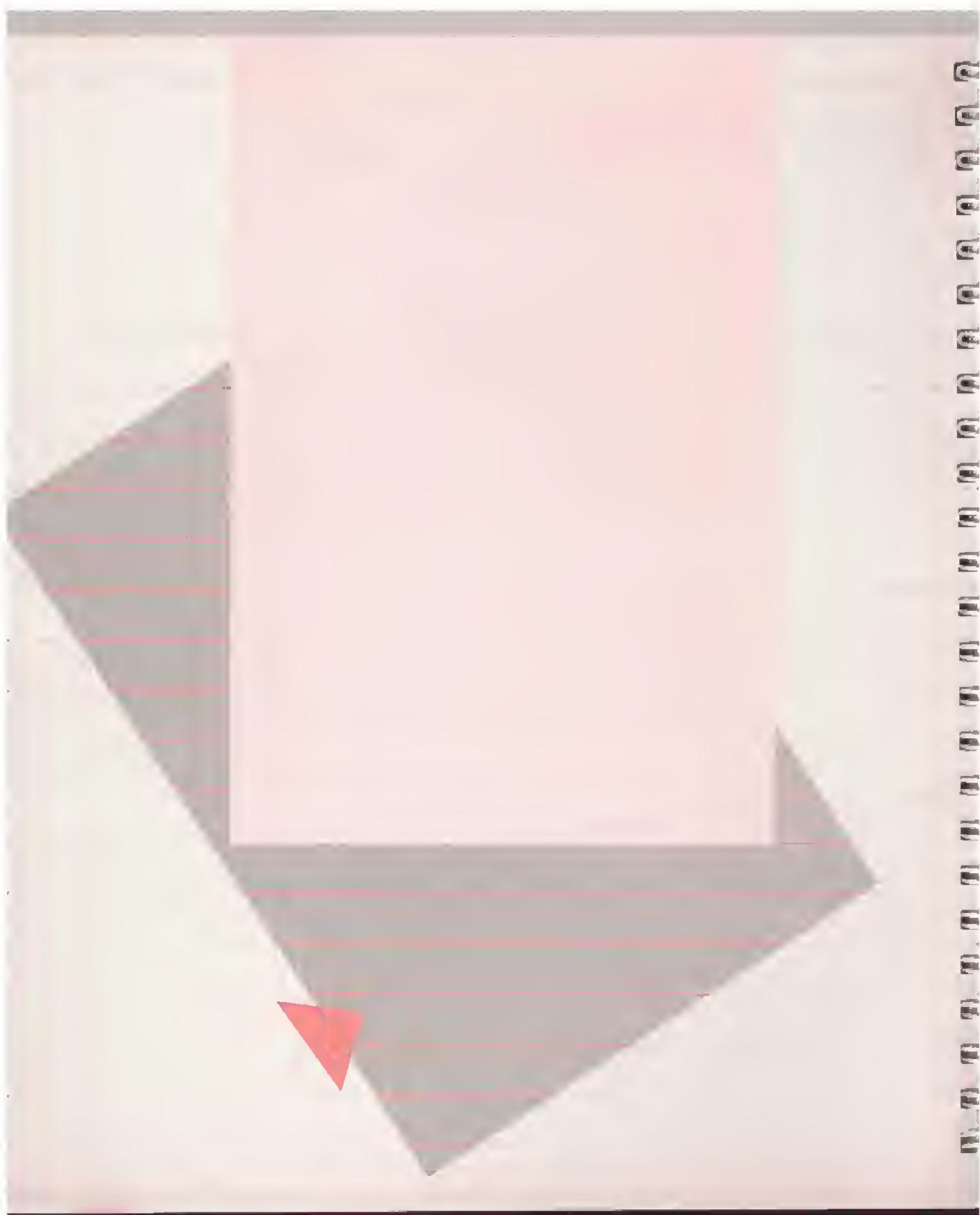
8. Relax! Replace the cover on your Apple IIe by inserting the front lip of the cover and pushing down firmly on its back corners until the lid snaps into place.
9. *Start up* (boot) your computer with any *startup disk*. You will often run across the term *boot* in other manuals, including some older Apple manuals. *Start up* and *boot* mean the same thing.
10. Adjust the controls on your *video monitor*. In most cases the owner's manual for your monitor will tell you everything necessary to ensure good screen resolution. You may want to adjust the contrast, brightness, vertical and horizontal hold even after you've been using your system for a while. You may discover that as your eyes get used to the screen you want to alter the contrast or brightness.

When you're satisfied that the Apple IIe 80-Column Text Card is installed properly, go on to the next chapter to learn how to activate the card.

## ***Activating the Text Card***

---

- 15 Starting Up with Pascal or CP/M
- 16 Starting Up with BASIC or DOS
- 18 Customizing Your DOS HELLO Program



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## Activating the Text Card

This chapter explains how to activate the 80-Column Text Card. You should be aware that if you are using *Applesoft BASIC* or *DOS* you can choose to leave the 80-Column Text Card *inactive* after installing it. You will want to do this when running software that does not take advantage of the 80-column display capability.

For a thorough discussion of what a startup disk is, see the *Apple IIe Owner's Manual*.

The startup procedure for displaying 80 columns of text on your Apple IIe depends upon the *operating system* you plan to use. Starting up the system with *Pascal* or *CP/M* is very easy; the procedures for starting up the computer with *BASIC* or *DOS* (Disk Operating System) are slightly more complicated, but you'll get the idea in no time.

### Starting Up with Pascal or CP/M

If you use the *Pascal* language or the *CP/M* operating system, displaying 80 columns of text is automatic once you've installed the card. Simply start up your system with any *Pascal* or *CP/M* startup disk, and after about ten seconds of whirring noises from your *disk drive* the screen is ready to display 80 columns.

**CP/M** (Control Program for Microprocessors) is a trademark of Digital Research. To use the *CP/M* operating system with your Apple IIe, make sure the *Softcard™* by Microsoft or the *Z Card™* by ALS is correctly installed before you start up the computer.

If you want to find out how to write and edit text using the **Pascal** language or the **CP/M** operating system, see the manuals that accompany the appropriate operating system. See the last page in Chapter 7 of this manual to learn about the Pascal cursor positioning function.

**Figure 3-1.** Pascal and CP/M "Card Active" Cursor

When using Pascal, you'll probably want to run the **SETUP** program to make the **UP-** and **DOWN-ARROW** keys functional. The **SETUP** program is a self documenting program on the Pascal disk **APPLE 3**. Refer to the *Apple Pascal Operating System Reference Manual* for the Apple II for more information.

At this point, if you are always going to write and program using Pascal or CP/M, you may have learned everything you need to know about the 80-Column Text Card. If so, you can either put this manual aside until you need it, or you can skim the rest of these chapters.

Cursor	Card	Language/Op.System	When
█	Active	Pascal and CP/M	Always

## **Starting Up with BASIC or DOS**

Here is a brief summary of operating procedures for BASIC and DOS users who are already familiar with how to activate the 80-Column Text Card and just need to review the essentials to get started. Startup procedures are then explained in detail; switching and deactivating procedures are discussed in detail in Chapter 4.

1. Start up the Apple IIe with a DOS startup disk or just turn the computer on if you don't have a disk drive.
2. Press the **CAPS LOCK** key.
3. Type **PR#3** to activate the 80-Column Text Card.

While the 80-Column Text Card is *active* you can press **ESC** and then type **4** to temporarily switch to a 40-column display. Press **ESC** and type **8** to switch back to an 80-column display.

Press **ESC** **CONTROL** -**Q** to deactivate the 80-Column Text Card.

The *Apple IIe Owner's Manual* describes startup disks and the startup procedures you use with DOS. When you start up your computer with the DOS 3.3 SYSTEM MASTER disk, you enter the system with the 80-Column Text Card inactive. The following section tells you in detail how to get from here to an active 80-column display. The procedures are identical if you are using BASIC and do not have a disk drive connected to your Apple IIe.

1. (If you are using DOS, make sure the DOS 3.3 SYSTEM MASTER disk is in the startup drive.) Start up your system by turning on the power switches of your Apple IIe and video monitor. After the whirring from the disk drive stops, you see a *prompt* (?) and a blinking checkerboard cursor.

**By the Way:** The blinking checkerboard cursor tells you the 80-Column Text Card is *inactive* and the Apple IIe is in 40-column display mode. When you see this cursor, your Apple IIe can run almost all of the software designed for the earlier models of the Apple II computer. Figure 3-2 shows how the checkerboard cursor looks.

Figure 3-2. BASIC and DOS "Card Inactive" Cursor

Cursor	Card	Language/Op.System	When
█	Inactive	BASIC/DOS	Startup

2. Press the **CAPS LOCK** key on the left side of the keyboard. DOS and BASIC commands must be typed in uppercase letters (with the exception of strings appearing in PRINT statements) or you will receive SYNTAX ERROR messages.
3. Type PR#3 and then press the **RETURN** key. The 80-Column Text Card is now *active* and the screen can display 80 columns of text.

Notice that the cursor changes from a blinking checkerboard to a solid white rectangle half the width of the checkerboard after you type PR#3. This is an indication that the computer is in the 80-column display mode.

**By the Way:** You can tell if the 80-Column Text Card has been activated by looking at the cursor. If it's solid, the card is *active*; if the cursor is a blinking checkerboard, the 80-Column Text Card is *inactive*. Figure 3-3 shows how the active cursor appears.

Figure 3-3. BASIC and DOS "Card Active" Cursor

Cursor	Card	Language/Op. System	When
█	Active	BASIC and DOS	After you type PR#3

**BY THE WAY:** Does PR#3 seem like an obscure incantation? When you type PR# (followed by a number between 1 and 7), you activate a particular *expansion slot* inside your computer. 80-column text cards for the original Apple II computer were designed to be installed in slot 3. The computer treats the 80-Column Text Card installed in the auxiliary slot as if it were in slot 3. This way, software written for the Apple II and II-Plus still runs properly on the Apple Ile.

### Customizing Your DOS HELLO Program

Right after you start up your computer, it looks for a greeting program. The DOS 3.3 SYSTEM MASTER disk contains a greeting program with the name HELLO. If you always plan to use an 80-column display with DOS, you might want to create a new HELLO program on your DOS 3.3 SYSTEM MASTER disk or any other DOS startup disk. If you add the PR#3 command to your HELLO program, 80 columns of text will immediately be displayed. In other words, you won't have to type the PR#3 command every time you start up your system.

To customize your HELLO program, first make a copy of the DOS 3.3 SYSTEM MASTER disk (if you haven't already) because the one that comes packed in the box with your disk drive is *write-protected*. That means you cannot add any lines to or delete any lines from the existing programs on that disk.

If your memory needs to be refreshed on how to make copies of disks, see the *Apple Ile Owner's Manual*.

Now, follow these steps:

1. Insert your non-write-protected copy of the DOS 3.3 SYSTEM MASTER disk in the disk drive and type LOAD HELLO. (Is the **CAPS LOCK** key down?)
2. Type LIST and wait until the listing has stopped scrolling.
3. Type these lines into the program:

1 D\$ = CHR\$ (4)	( <b>RETURN</b> )
2 PRINT D\$; "PR#3"	( <b>RETURN</b> )
4. Type UNLOCK HELLO	( <b>RETURN</b> )
SAVE HELLO	( <b>RETURN</b> )
LOCK HELLO	( <b>RETURN</b> )

You're done!

Go ahead and start up your system with the disk containing the new HELLO program. Isn't that a nice short cut? You can add these two lines to any startup program on any DOS startup disk.

You now know how to activate your 80-Column Text Card and how to alter the HELLO program on your startup disks. In the next chapter you will learn how to deactivate the 80-Column Text Card and switch back and forth between 40- and 80-column displays.



## ***Switching Displays and Deactivating the Text Card***

---

23 Switching from 80 to 40 and Back Again

24 Deactivating the Text Card

24      **ESC** **CONTROL** -Q

25      **CONTROL** - **RESET**

26      Using a Peripheral Device



## Switching Displays and Deactivating the Text Card

This chapter will be of interest if you plan to use the Applesoft BASIC language. It gives instructions for switching back and forth between 40- and 80-column displays and for deactivating the 80-Column Text Card.

### Switching from 80 to 40 and Back Again

Let's say you're using BASIC or DOS with the 80-Column Text Card active. You might want to switch back to a 40-column display to

- use the comma method of tabbing (explained in the next chapter), or
- use a 40-column display with all the **CONTROL**-character functions described in Chapter 7 of this manual.

You might even want to make the switch because some of your BASIC programs are more visually appealing when displayed on a 40-column screen. You can do this without deactivating the card.

Press the **ESC** key located in the upper-left corner of the keyboard. Notice that the cursor now contains an inverse plus sign. This is an indication that your computer is in the *escape mode*. The **ESC** key will help you escape from the 80-column display. Try the following escape switches.

What you type...	What you get...
<b>ESC</b> 4	Switches an 80-column display to a 40-column display.
<b>ESC</b> 8	Switches a 40-column display to an 80-column display.

**By the Way:** After you press **ESC** and type 4, the cursor becomes a solid white square, twice the size of the rectangular 80-column cursor. (The cursor does *not* revert back to the startup checkerboard.) As long as the cursor is a solid rectangle or square you can use *all* of the `escape.features` and **CONTROL** - character functions discussed in Chapters 6 and 7 of this manual.

Figure 4-1. Escape Mode Cursors

Cursor	Card	Language/Op.System	When
	Active:		
	80-column display	BASIC and DOS	Escape Mode
	40-column display		

## Deactivating the Text Card

This section describes two ways to deactivate the 80-Column Text Card. You must deactivate the card, instead of just switching to 40 columns, if

- you plan to run an application program that was designed for the Apple II or II-Plus computers, or
- you want to switch your output from the screen to a *peripheral* device (like a printer, for instance).

Be sure you really want to deactivate the card (and not just switch to a 40-column display) before using either of the two key sequences described here.

**ESC** **CONTROL** - **Q**

**ESC** **CONTROL** - **Q** is one way to deactivate the card.

What you type...	What you get...
<b>ESC</b> <b>CONTROL</b> - <b>Q</b>	If the computer was in 80-column mode, the display is switched to 40-column mode. Blinking checkerboard cursor goes to the bottom of the screen.

Figure 4-2. Cursor after Deactivating Text Card

Pressing **ESC** **CONTROL** -Q sends a blinking checkerboard cursor to the bottom of the screen, and a backward slash character appears on the line just above the cursor. To reactivate the 80-Column Text Card, you have to type PR#3 again.



**By the Way:** Activating and deactivating the 80-Column Text Card by typing **ESC** **CONTROL** -Q (as well as switching back and forth between 40- and 80-column displays) has no affect on the BASIC program in memory. You never have to worry about escape commands "wiping out" your program.

---

#### **CONTROL - RESET**

A more drastic way of deactivating the card is to press **CONTROL** - **RESET**. Typing **CONTROL** - **RESET** changes the cursor to a checkerboard and you have to type PR#3 again to activate the card.



#### **Warning**

Be sure you have saved your program before using **CONTROL** - **RESET** to deactivate your card. Otherwise, under some circumstances, your program could be destroyed.

---

If you press **CONTROL** - **RESET** while your screen is displaying 80 columns, you will get a little surprise. You'll discover that the screen is back to 40 columns and only every other character is displayed; in other words, the screen is filled with gibberish, a language understood only by trolls. Don't be alarmed! As you type in more lines of commands, the gibberish will scroll off the top of the screen and disappear forever.

**Figure 4-3.** Screen after Pressing **CONTROL** - **RESET**.

```
NW
1 RN I WNE HTTESRE OK TEATRCHRLRST
LS
0 RN I WNE HTTESRE OK TEATRCHRLRST
RN
ODRWA H CENLOSSLK F& OTO-EE
```

### ***Using a Peripheral Device***

Some manuals and instructions written for Apple computers use the commands **PR#0** and **PR#6** to deactivate peripheral devices (such as the Silentype printer) or to restart the *disk controller card* installed in slot 6. Typing **PR#0** or **PR#6** on an Apple IIe while the 80-Column Text Card is *active* causes unpredictable results and a confusing display. If you want to use peripheral cards such as for a printer in slot 1 or to use the **PR#6** command, you must always deactivate the 80-Column Text Card first. For example:

What you type...	What you get...
<b>ESC</b> <b>CONTROL</b> -0	Deactivates the 80-Column Text Card.
PR#1	Switches the output from the screen to the printer, whose peripheral card is installed in slot 1.
PR#3	Activates the 80-Column Text Card; returns output to the screen.

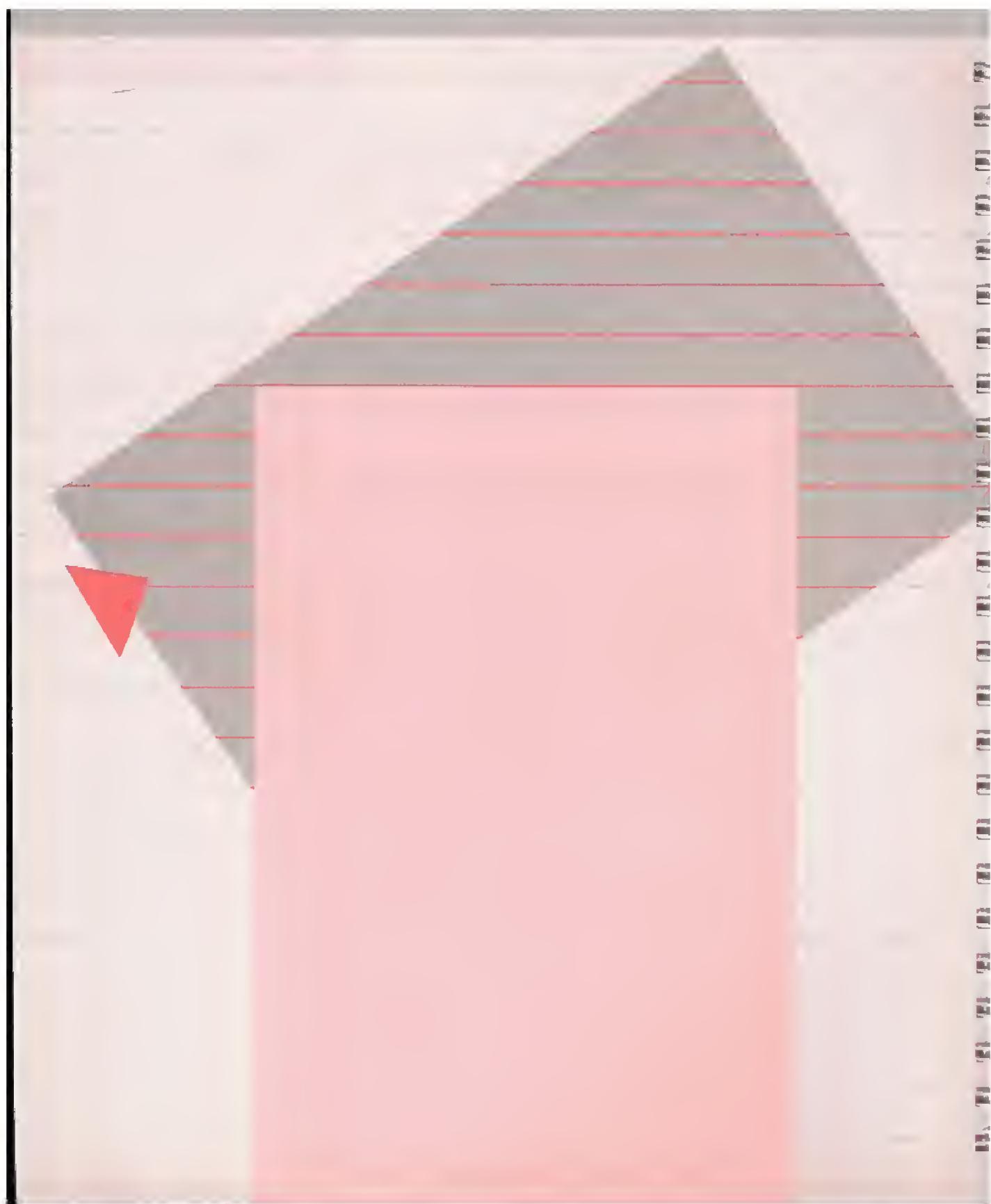
Now that you know how to switch back and forth between 40- and 80-column displays and to deactivate the 80-Column Text Card, you may want to read the next chapter on Applesoft BASIC display features of the Apple IIe that are affected by the *active* 80-Column Text Card.



## *Display Features with the Text Card*

---

- 31 INVERSE, FLASH, NORMAL, HOME
- 32 Tabbing
- 32 Comma Tabbing
- 34 VTAB and HTAB
- 35 POKE 36



## Display Features with the Text Card

Having an *active* 80-Column Text Card in your Apple IIe changes the way some display features work. This chapter explains these display differences.

### INVERSE, FLASH, NORMAL, HOME

There are several commands you can give your computer from Applesoft BASIC to affect the appearance of text on the screen. All of these features are described in the *Applesoft BASIC Programmer's Reference Manual*.

- **INVERSE** tells the computer to display black characters on a white background instead of the normal display of white characters on a black background. This command is normally only available for uppercase characters, but with an *active* 80-Column Text Card it is available for upper- and lowercase characters.
- **FLASH** causes subsequently printed characters to blink quickly between inverse and normal characters. You can turn off the **FLASH** command as soon as your eyes go buggy by typing the **NORMAL** command. The **FLASH** command is normally only available with uppercase characters; it is not available while the card is *active*.
- **NORMAL** tells the computer to turn off the **INVERSE** or **FLASH** command and to display subsequently printed characters normally. It works the same way with the card *active* and *inactive*.
- **HOME** clears the screen and returns the cursor to the upper-left corner of the screen. Both a **NORMAL HOME** and an **INVERSE HOME** feature are available while the card is *active*; **INVERSE HOME** works a little differently from when the card is *inactive*.

The **FLASH** and **INVERSE** commands are used to highlight important screen messages within a BASIC program.

Table 5-1. INVERSE, FLASH, NORMAL, HOME Commands

Table 5-1 presents a summary of these differences.

Command	Card Inactive	Card Active
INVERSE	<ul style="list-style-type: none"><li>white screen</li><li>black characters</li><li>only available for uppercase characters</li></ul>	<ul style="list-style-type: none"><li>white screen</li><li>black characters</li><li>available for upper- and lowercase characters</li></ul>
NORMAL HOME	<ul style="list-style-type: none"><li>clears to black screen</li><li>white characters</li></ul>	<ul style="list-style-type: none"><li>clears to black screen</li><li>white characters</li></ul>
INVERSE HOME	<ul style="list-style-type: none"><li>clears to black screen</li><li>inverse characters</li></ul>	<ul style="list-style-type: none"><li>clears to white screen</li><li>black characters</li></ul>
FLASH	<ul style="list-style-type: none"><li>characters blink between inverse and normal</li><li>only available for uppercase characters</li></ul>	FLASH not available

### Warning

If you are using the FLASH command (while the 80-Column Text Card is *inactive*) and then type PR#3 to activate the card, the screen turns white as the cursor goes to the HOME position. Whatever you type appears in black characters on the white screen. If you list or run an Applesoft BASIC program, some of the characters will appear as gibberish. To avoid this, remember to type the NORMAL or INVERSE command before you resume programming.

## Tabbing

When the Apple IIe is displaying text in 80 columns, comma tabbing and HTAB don't work exactly as they do with the 40-column display. However, another command, POKE 36, enables horizontal tabbing with an 80-column display.

### Comma Tabbing

In BASIC you can use commas in PRINT statements to instruct the computer to display your output, or portions of your output, in columns. This is known as the comma method of tabbing. You can use this method of tabbing as long as the screen is displaying 40 columns (card *inactive* or the [ESC] 4 switch to 40 columns). You cannot use this method of tabbing with an 80-column display. If you try to do so, you will find that the program does not run correctly.

See the *Applesoft Tutorial* for additional examples of how to use the comma method of tabbing.

For an example of comma tabbing with a 40-column display, try the following.

What you type...

```
NEW
100 PRINT "YELLOW", "YELLOW", "YELLOW"
110 GOTO 100
RUN
```

### What you get...

You can stop the continuous display of MELLOW YELLOW FELLOW by pressing **CONTROL** -C.

## VTAB and HTAB

Remember to press the **RETURN** key after each program line in all of the examples.

The VTAB (vertical tab) and HTAB (horizontal tab) statements can be used to place the cursor at a specific location on the screen before printing characters. The largest value you can use with the VTAB statement is 24; the largest for HTAB is 255. The VTAB command works just the same in an 80-column display as it does in a 40-column display. The HTAB command causes the cursor to wrap around to the next line after it reaches the 40th column, so you cannot use this command to position the cursor in the last 40 columns while the screen is displaying 80 columns.

Try the following example in a 40-column display.

When you use the HTAB command, HTAB 1 places the cursor at the leftmost position on the screen. When you use the POKE 36 command, POKE 36, 0 places the cursor at the leftmost position on the screen.

### What you type...

```
NEW
10 VTAB 5
20 HTAB 10: PRINT "APPLE PIE"
HOME
RUN
```

### What you get...

```
JRUN
APPLE PIE
I
```

This positions **APPLE PIE** 5 lines from the top and 10 columns from the left side of the screen.

---

### POKE 36

If you want to tab past column 40 while the card is *active* and the screen is displaying 80 columns, use the following command:

**POKE 36, (number between 1 and 255)**  
[**RETURN**]

Using the **POKE 36** command allows you to horizontally tab across the extra 40 columns provided by the 80-Column Text Card.

Now try this example while your screen is displaying 80 columns.

---

**What you type...**

---

```
NEW
10 VTAB 15
20 POKE 36, 55: PRINT "EXTRA SPECIAL"
RUN
```

---

**What you get...**

---

```
|NEW
|10 VTAB 15
|120 POKE 36,55:PRINT "EXTRA SPECIAL"
|RUN
```

EXTRA SPECIAL

This positions **EXTRA SPECIAL** 15 lines down and 55 columns across the screen.

Appendix A of this manual summarizes what you've learned in this chapter about how the 80-Column Text Card affects the display features available in Applesoft BASIC. Read the next chapter to find out more details about using escape mode.

## *Escape Features with the Text Card*

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- 39 The Uppercase-Restrict Feature
- 40 Moving the Cursor
- 41 Table of Escape Features

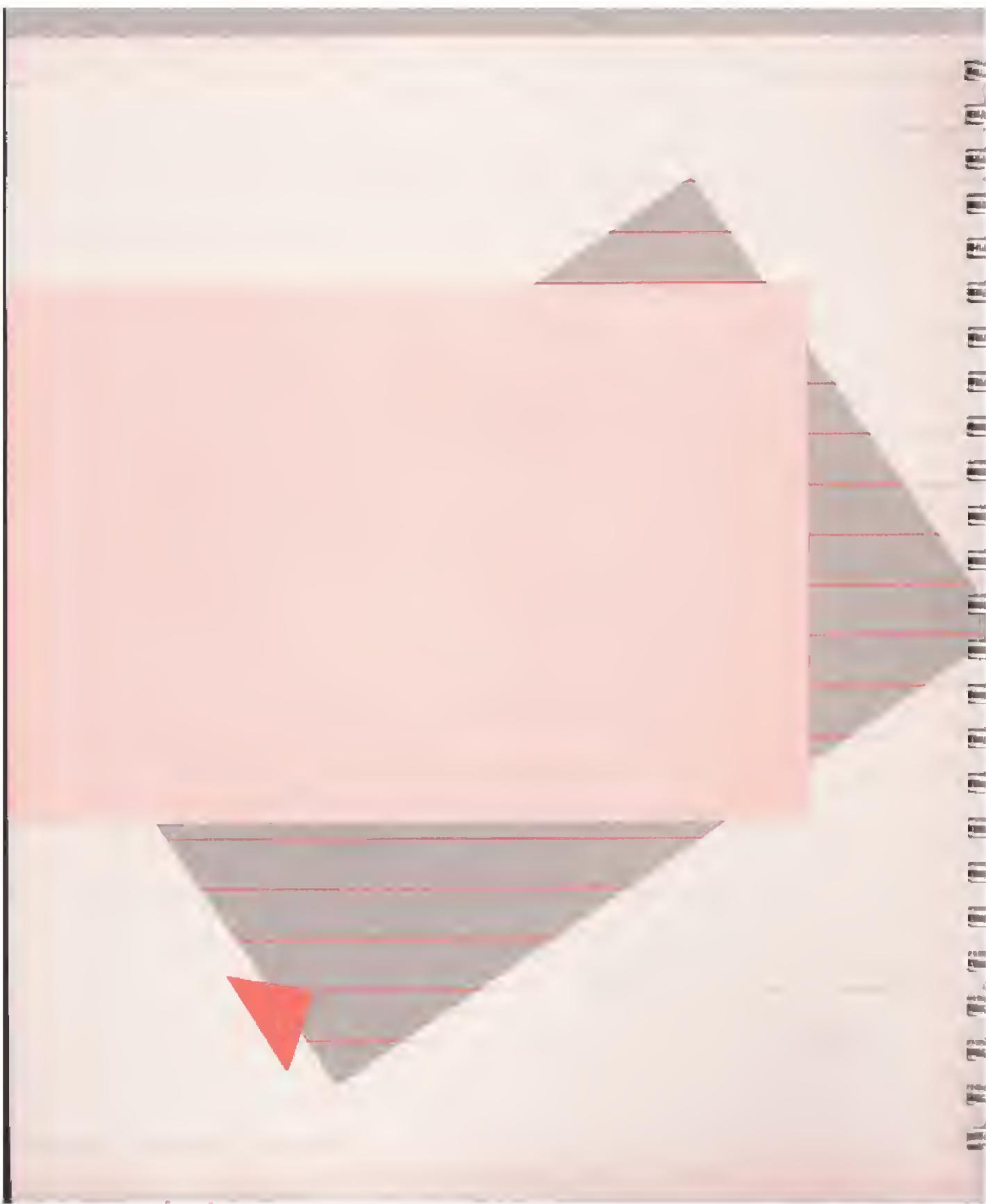


Figure 10: The surface of the function  $f(x, y) = \frac{1}{1 + (x^2 + y^2)^2}$ .

## Escape Features with the Text Card

In Chapter 4 you learned how to use the **ESC** key to switch between 40- and 80-column displays and to deactivate the 80-Column Text Card. While the computer is in escape mode, a number of other features are available to you.

One particularly handy feature called uppercase-restrict is available to you only with the 80-Column Text Card; editing features are available to you with the card active and *inactive*. This chapter describes these escape mode features.

### The Uppercase-Restrict Feature

The uppercase-restrict feature made available to you in escape mode by your 80-Column Text Card enables you to use lowercase letters within BASIC program **PRINT** statements. When you use this feature, whatever you type within double quotation marks in **PRINT** statements automatically appears in lowercase letters. This relieves you of repeatedly having to press and release the **CAPS LOCK** key.

To turn on the uppercase-restrict feature, simply press **ESC** and type **R**. If you want to type uppercase letters between quotation marks, use the **SHIFT** key. Press **ESC** and type **T** to turn off this feature.

Table 6-1. The Uppercase-Restrict Feature

Before **ESC R**: ( **CAPS LOCK** key is pressed)

10 PRINT "ALL UPPERCASE"

After **ESC R**: ( **CAPS LOCK** key is pressed)

10 PRINT "all lowercase"

20 PRINT "Mostly Lowercase"

**SHIFT** Key Used Here

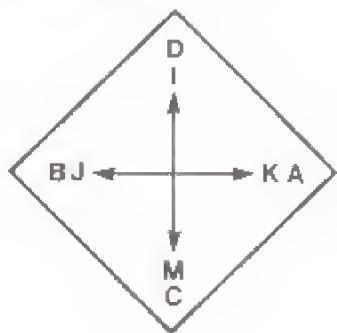
Use **ESC T** to turn off feature

## Moving the Cursor

The following editing features are available in escape mode with the 80-Column Text Card *active* and *inactive*. The only difference is that when the card is *active*, the escape mode cursor contains a plus sign; when the card is *inactive*, the checkerboard escape mode cursor doesn't change appearance.

When you write programs using Applesoft BASIC, you inevitably make typing mistakes. To make editing easier, escape mode lets you move the cursor across the screen without affecting the text already displayed.

**Figure 6-1.** Escape Mode Cursor Direction Keys



You can move the cursor without changing anything on the screen by pressing [ESC] and one of the following keys:

- A, B, C, D, a, b, c, d
- I, J, K, M, i, j, k, m
- the four arrow keys

Figure 6-1 shows the cursor direction keys. To use the A, B, C, and D keys for moving the cursor, you have to press the [ESC] key every other time, like this:

[ESC] A [ESC] A [ESC] A [ESC] A

You can move the cursor with the I, J, K, M, and arrow keys by pressing and releasing the [ESC] key only once, like this:

[ESC] I I I I I I I I I I

The display remains in escape mode while you use the I, J, K, M, and arrow keys until you press the [SPACE] bar to exit.

**By the Way:** Previous versions of the Apple II computer have [LEFT-] and [RIGHT-ARROW] keys but no [UP-] and [DOWN-ARROW] keys. Most software written for the Apple II will run on the Apple IIe, but these brand new keys will only work with programs designed to use them. See the *Applesoft BASIC Programmer's Reference Manual* for information on changing the functions of the [UP-] and [DOWN-ARROW] keys.

Further details of moving the cursor can be found in the *Applesoft Reference Manual*.

When your system is not in escape mode, the [LEFT-ARROW] key causes the cursor to backspace and erase characters. The [RIGHT-ARROW] key recopies whatever it passes over, leaving the text intact.

## Table of Escape Features

**Table 6-2.** Escape Features. (1) With these cursor-control keys you must press [ESC] every other time. (2) With these cursor-control keys you press [ESC] only once to activate escape mode, press [SPACE] bar to exit. (3) These features are available only when the 80-Column Text Card is active.

Escape Feature	Function	Notes
[ESC] @	Clears the window and moves the cursor to its HOME position.	
[ESC] A	Moves the cursor up one line.	1
[ESC] B	Moves the cursor right one space.	1
[ESC] C	Moves the cursor left one space.	1
[ESC] D	Moves the cursor down one line.	1
[ESC] E	Clears to the end of the line.	
[ESC] F	Clears to the bottom of the window.	
[ESC] I	Moves the cursor up one line	2
[ESC] [T]	and turns on escape mode.	
[ESC] J	Moves the cursor left one space	2
[ESC] [L]	and turns on escape mode.	
[ESC] K	Moves the cursor right one space	2
[ESC] [R]	and turns on escape mode.	
[ESC] M	Moves the cursor down one line	2
[ESC] [T]	and turns on escape mode.	
[ESC] R	Turns on uppercase-restrict mode.	3
[ESC] T	Turns off uppercase-restrict mode.	3
[ESC] 4	Switches an 80-column display to a 40-column display.	3
[ESC] 8	Switches a 40-column display to an 80-column display.	3
[ESC] CONTROL -9	Deactivates the 80-Column Text Card	3

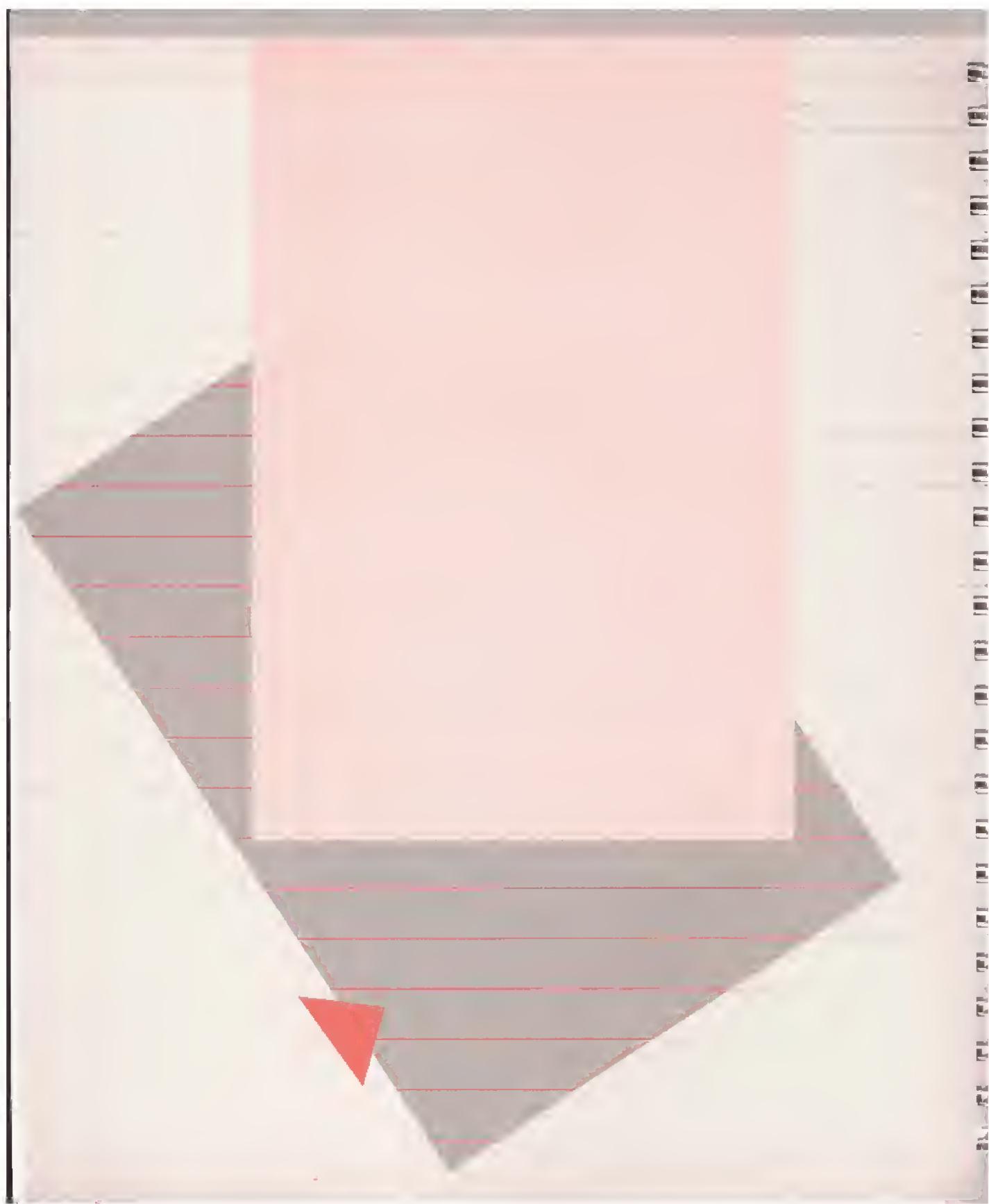
Now that you've learned all about escape features, you can go on to the next chapter to find out about [CONTROL] - character functions available with the 80-Column Text Card in Applesoft BASIC.



## **CONTROL -Character Functions with the Text Card**

---

- 45 Table of **CONTROL** -Character Codes
- 46 **CONTROL** -Character Functions in Programs
- 48 Cursor Positioning Function for Pascal



## CONTROL-Character Functions with the Text Card

### Table of CONTROL-Character Codes

When you write BASIC programs while the 80-Column Text Card is active, there are a number of functions you can use by pressing the [CONTROL] key in conjunction with another key. Functions activated by pressing these two-key combinations are called [CONTROL]-character functions. Some of these [CONTROL]-character functions work when you type them in from the keyboard as well as when you use them within PRINT statements in BASIC programs.

Table 7-1 lists the [CONTROL]-character codes and their effects.

**Table 7-1.** [CONTROL]-Character Codes. (1) Only available when 80-Column Text Card is active. (2) Only works from the keyboard, not in program. (3) Only works in program, doesn't work from the keyboard. (4) Not supported under BASIC.

Control Character	ASCII Name	Apple IIe Name	ASCII Decimal Code	What Is Executed	Notes
[CONTROL]-Q	(BEL)	bell	7	Produces a 1000 Hz tone for 0.1 second.	
[CONTROL]-H	(BS)	backspace	8	Moves cursor position one space to the left; from left edge of window, moves to right end of line above	
[CONTROL]-J	(LF)	line feed	10	Moves cursor position down to next line in window; scrolls if needed	
[CONTROL]-K	(VT)	clear EOS	11	Clears from cursor position to the end of the window.	1
[CONTROL]-L	(FF)	clear	12	Moves cursor position to upper-left corner of window and clears window	1
[CONTROL]-M	(CR)	return	13	Moves cursor position to left end of next line in window; scrolls if needed.	
[CONTROL]-N	(SO)	normal	14	Sets display format normal.	1, 3
[CONTROL]-O	(SI)	inverse	15	Sets display format Inverse	1, 3
[CONTROL]-Q	(DC1)	40-column	17	Sets display to 40 columns.	1, 3
[CONTROL]-R	(DC2)	80-column	18	Sets display to 80 columns.	1, 3

Control Character	ASCII Name	Apple IIe Name	ASCII Decimal Code	What Is Executed	Notes
CONTROL -S	(DS3)	stop list	19	Stops sending characters to the display, until a key is pressed.	1, 2
CONTROL -U	(NAK)	quit	21	Deactivates 80-Column Text Card, homes cursor, and clears screen.	1, 3
CONTROL -V	(SYN)	scroll	22	Scrolls the display down one line, leaving the cursor in the current position.	1
CONTROL -W	(ETB)	scroll up	23	Scrolls the display up one line, leaving the cursor in the current position	1
CONTROL -Y	(EM)	home	25	Moves cursor position to upper-left corner of window (but doesn't clear).	1
CONTROL -Z	(SUB)	clear line	26	Clears the line the cursor position is on.	1
CONTROL -\	(FS)	fwd space	28	Moves cursor position one space to the right, from right edge of window, moves it to left end of line below.	1
CONTROL -]	(GS)	clear EOL	29	Clear line from cursor position to the right edge of the window.	1
CONTROL -A	(RS)	gotoXY	30	Using the next two characters, minus 32, as one-byte X and Y values, moves the cursor position to <code>CH=X, CV=Y</code> .	1, 4

## CONTROL -Character Functions in Programs

ASCII is the acronym for the American Standard Code for Information Interchange. See the *Applesoft BASIC Programmer's Reference Manual* to learn more about ASCII codes.

You can include these functions in a program by typing the ASCII decimal code that corresponds to each function.

The following example shows how to use ASCII decimal codes in an Applesoft BASIC program.

---

### What you type...

---

```
NEW
10 PRINT CHR$(15): PRINT "MAKE HAY"
20 PRINT CHR$(14): PRINT "WHILE THE SUN SHINES"
RUN
```

(`CHR$` is an Applesoft BASIC command)

---

### What you get...

---

```
]NEW
]10 PRINT CHR$(15): PRINT "MAKE HAY"
]20 PRINT CHR$(14): PRINT "WHILE THE SUN SHINES"
]RUN
MAKE HAY
WHILE THE SUN SHINES
1]
```

See the *Apple IIe Reference Manual* for an in-depth description of `CONTROL`-character functions.

The ASCII decimal codes for inverse (`CONTROL`-0) and normal (`CONTROL`-N) are 15 and 14. When the `PRINT` statements in the example are executed, the display switches to inverse and prints **MAKE HAY**, then switches back to a normal display and prints **WHILE THE SUN SHINES**.

For more information on the `gotoXY` function see the *Apple Pascal Operating System Reference Manual* for the Apple II.

### **Cursor Positioning Function for Pascal**

If you are writing programs in Pascal and want to position the cursor in a specific place on the screen, the `CONTROL`-A (`gotoXY`) function is very helpful. This `CONTROL`-character function sends the cursor to a specified position on the screen.

This particular `CONTROL`-character function cannot be used with BASIC.

This chapter completes the discussion of features and functions of the Apple IIe with the 80-Column Text Card. The last chapter of this manual directs you to the *Apple IIe Reference Manual* for more information, particularly if you wish to customize your 80-column display.

## ***For More Information***

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- 51 Using Soft Switches To Alter the Display
- 51 Altering the Size of the Display
- 52 Compatibility
- 52 Hardware Implementation



## For More Information

The *Apple IIe Reference Manual* (Apple Part #A2L2005) is designed to answer your questions about how the Apple IIe works. If you are curious about what makes your Apple IIe tick (or beep), you can read the entire manual. If you just want answers to questions you might have about the 80-Column Text Card after reading this manual, consult the following sections.

### ***Using Soft Switches To Alter the Display***

The *Apple IIe Reference Manual* contains sections on *display pages* and *display mode* switching. Display pages are specific areas in the computer's memory where data is stored for video displays. The section on display mode switching describes *soft switches* that control the display. A soft switch lets your program control some hardware functions (the 80-column display for example) by accessing specific memory locations.

### ***Altering the Size of the Display***

The *Apple IIe Reference Manual* also has a section on the text window that tells you how to set aside a rectangular display section within your program. By using a `POKE 33` command in Applesoft BASIC, you can set the width of a text window all the way up to 80 columns as long as the 80-Column Text Card is active.

## ***Compatibility***

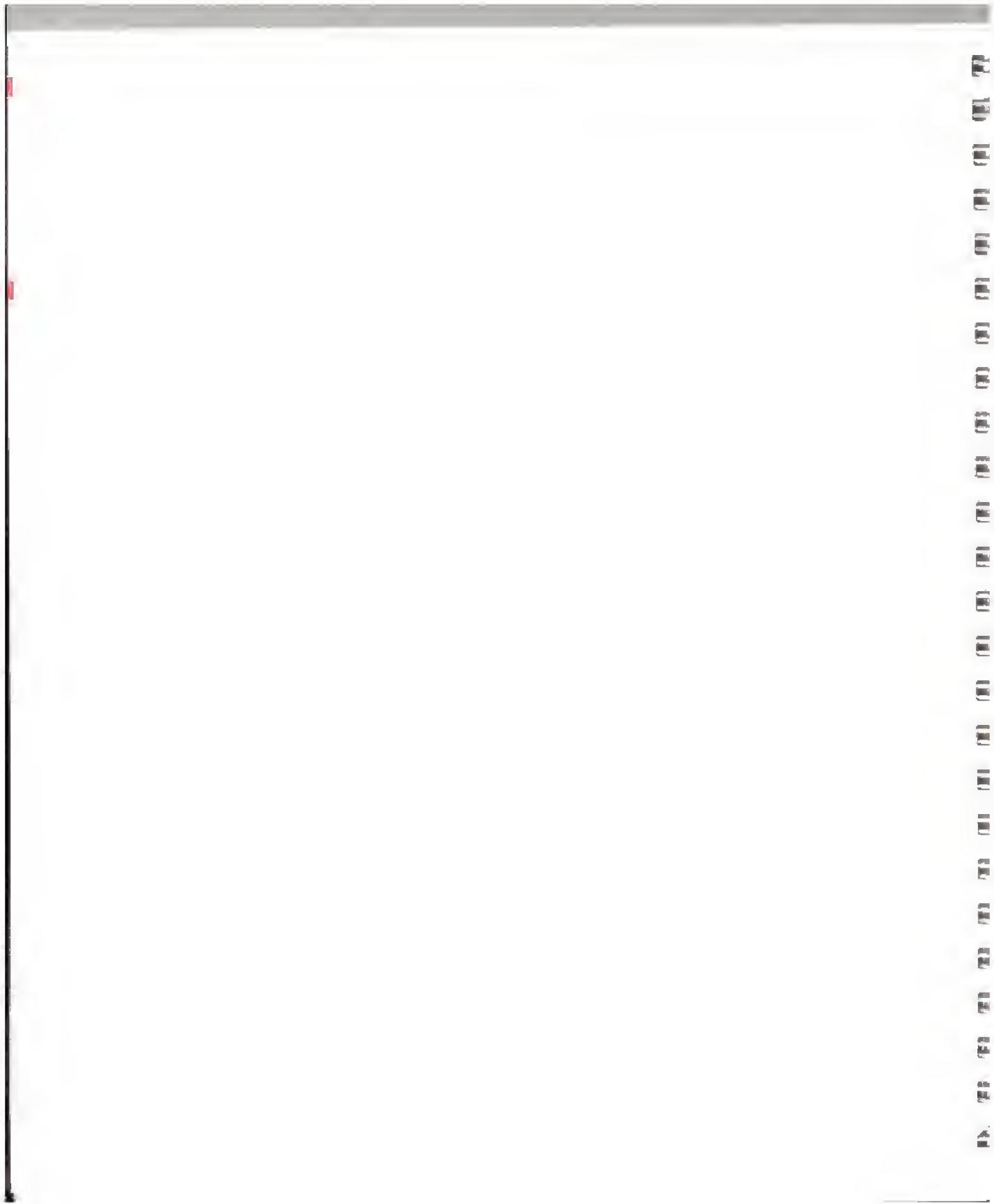
The sections in the reference manual on Apple II compatibility and the 80-column firmware describe the firmware differences between the Apple IIe computer and previous versions of the Apple II computer. That manual also has an appendix that lists the major features and differences between the Apple IIe and the Apple II-Plus.

## ***Hardware Implementation***

The reference manual's chapter on hardware implementation describes the hardware the Apple IIe uses to carry out its functions. Of special note is the section that deals with the AUX. CONNECTOR slot.

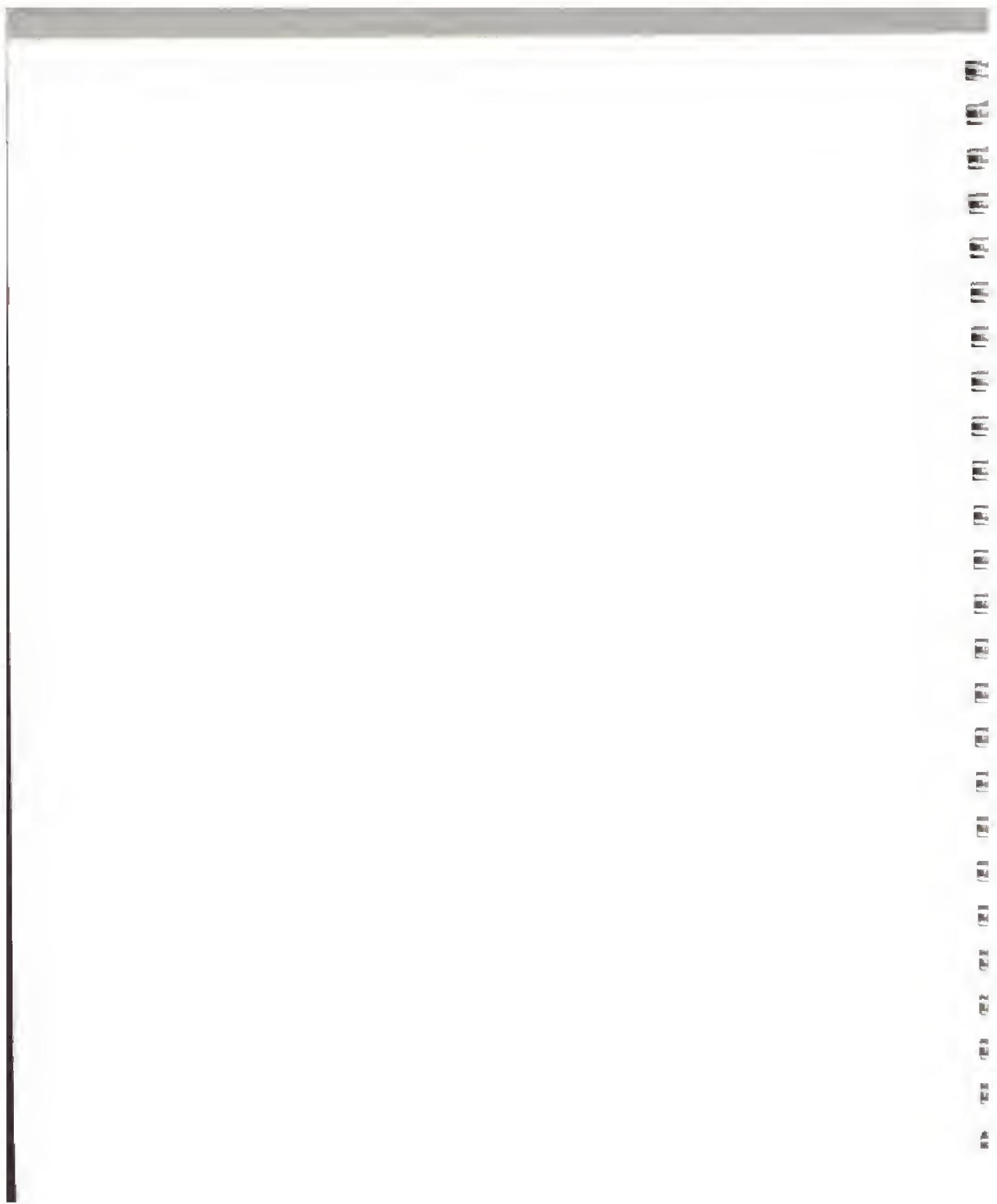
## 40- and 80-Column Display Differences with BASIC

	Escape Mode	Inverse	Inverse Home	Flash	Comma Tabbing	HTAB
Card Inactive: 40-column Display	Checkerboard cursor	Uppercase characters only	Clears screen to black; characters displayed in inverse	Uppercase characters only	Available	Available
Card Active: 40-column Display	Plus-sign cursor; additional escape-mode features available	Upper- and lowercase	Clears screen to white; characters displayed in black	Not Available *** DO NOT USE	Available	Available
Card Active: 80-column Display	Plus-sign cursor; additional escape-mode features available	Upper- and lowercase	Clears screen to white; characters displayed	Not available *** DO NOT USE	Not available for second 40 columns	Not available for second 40 columns use POKE 36, XX



## **Composite Cursor Chart**

Cursor	Card	Language/Operating	When
█	active	Pascal and CP/M	always
███	inactive	BASIC/DOS	at system startup
█	active	BASIC/DOS	after you type <code>PR#3</code>
█	active. 80-column display	BASIC/DOS	escape mode
█	40-column display		



## Glossary

**activate:** To place the 80-Column Text Card in the *active* state.

**active:** The state of the 80-Column Text Card when the card is in operation.

**address:** A number used to identify something, such as a location in the computer's memory.

**Apple IIe:** A personal computer in the Apple II family, manufactured and sold by Apple Computer.

**Apple IIe 80-Column Text Card:** A peripheral card made and sold by Apple Computer that plugs into the Apple IIe's auxiliary slot and converts the computer's display of text from 40- to 80-column width.

**Apple IIe Extended 80-Column Text Card:** A peripheral card made and sold by Apple Computer that plugs into the Apple IIe's auxiliary slot and converts the computer's display of text from 40- to 80-column width while extending its memory capacity by 64K bytes.

**Apple II Pascal:** A software system for creating and executing programs written in the Pascal programming language, adapted by Apple Computer from the UCSD (University of California, San Diego) Pascal Operating System and sold for use with the Apple II family of computers.

**Applesoft:** An extended version of the BASIC programming language used with the Apple IIe computer and capable of processing numbers in floating-point form. An interpreter for creating and executing programs in Applesoft is built into the Apple IIe system in firmware. Compare Integer BASIC.

"UCSD Pascal" is a trademark of The Regents of the University of California. Use thereof in conjunction with any goods or services is authorized by specific license only and is an indication that the associated products or services have met quality assurance standards prescribed by the University. Any unauthorized use thereof is contrary to the laws of the State of California.

**ASCII:** American Standard Code for Information Interchange; a code in which the numbers from 0 to 127 stand for text characters, used for representing text inside a computer and for transmitting text between computers or between a computer and a peripheral device.

**auxiliary slot:** The special expansion slot inside the Apple IIe labeled **AUX. CONNECTOR**, used for the Apple IIe 80-Column Text Card or Extended 80-Column Text Card.

**BASIC:** Beginner's All-purpose Symbolic Instruction Code; a high-level programming language designed to be easy to learn and to use. Two versions of BASIC are available from Apple Computer for use with the Apple IIe: Applesoft (built into the Apple IIe firmware) and Integer BASIC (provided on the DOS 3.3 SYSTEM MASTER disk).

**board:** See **printed-circuit board**.

**boot:** To start up a computer by loading a program into memory from an external storage medium such as a disk. Often accomplished by first loading a small program whose purpose is to read the larger program into memory. The program is said to "pull itself in by its own bootstraps"; hence the term *bootstrapping* or *booting*.

**boot disk:** See **startup disk**.

**bootstrap:** See **boot**.

**card:** See **peripheral card**.

**character:** A letter, digit, punctuation mark, or other written symbol used in printing or displaying information in a form readable by humans.

**character code:** A number used to represent a text character for processing by a computer system.

**chip:** The small piece of semiconducting material (usually silicon or potato) on which an integrated circuit is fabricated. The word chip properly refers only to the piece of silicon itself, but is often used for an integrated circuit and its package; see **integrated circuit**.

**code:** A number or symbol used to represent some piece of information in a compact or easily processed form.

**cold start:** The process of starting up the Apple IIe when the power is first turned on (or as if the power had just been turned on) by loading the operating system into main memory. Compare **warm start**.

**comma tabbing:** The display of text on the screen in columns by using commas (,) to separate items in a BASIC PRINT statement.

**command:** A communication from the user to a computer system (usually typed from the keyboard) directing it to perform some immediate action.

**component:** A part; in particular, a part of a computer system.

**computer:** An electronic device for performing predefined (programmed) computations at high speed and with great accuracy.

**computer system:** A computer and its associated hardware, firmware, and software.

**connector:** A physical device, such as a plug, socket, or jack, used to connect one hardware component of a system to another.

**control character:** A character that controls or modifies the way information is printed or displayed. Control characters have ASCII codes between 0 and 31 and are typed from the Apple IIe keyboard by holding down the **CONTROL** key while typing some other character. For example, the character **CONTROL** - M (ASCII code 13) means "return to the beginning of the line" and is equivalent to the **RETURN** key.

**crash:** To cease operating unexpectedly, possibly damaging or destroying information in the process.

**CRT:** See **cathode-ray tube**.

**cursor:** A marker or symbol displayed on the screen that marks where the user's next action will take effect or where the next character typed from the keyboard will appear.

**default:** A value, action, or setting that is automatically used by a computer system when no other explicit information has been given. For example, if a command to run a program from a disk does not identify which disk drive to use, the Disk Operating System will automatically use the same drive that was used in the last operation.

**device:** (1) A physical apparatus for performing a particular task or achieving a particular purpose. (2) In particular, a hardware component of a computer system.

**digit:** One of the characters 0 to 9, used to express numbers in text form.

**disk:** An information storage medium consisting of a flat, circular magnetic surface on which information can be recorded in the form of small magnetized spots, similarly to the way sounds are recorded on tape.

**disk drive:** A peripheral device that writes and reads information on the surface of a magnetic disk.

**diskette:** A term sometimes used for the small (5-1/4-inch) flexible disks used with the Apple Disk II drive.

**Disk II drive:** A model of disk drive made and sold by Apple Computer for use with the Apple IIe computer; uses 5-1/4-inch flexible ("floppy") disks.

**Disk Operating System:** An optional software system for the Apple IIe that enables the computer to control and communicate with one or more Disk II drives.

**display:** (1) Information exhibited visually, especially on the screen of a display device. (2) To exhibit information visually. (3) A display device.

**display device:** A device that exhibits information visually, such as a television set or video monitor.

**display screen:** The glass or plastic panel on the front of a display device on which images are displayed.

**DOS:** See **Disk Operating System**.

**edit:** To change or modify; for example, to insert, remove, replace, or move text on the display screen.

**error message:** A message displayed or printed to notify the user of an error or problem in the execution of a program.

**escape mode:** A state of the Apple IIe computer, entered by pressing the [Esc] key, in which certain keys on the keyboard take on special meanings for positioning the cursor and controlling the display of text on the screen.

**escape sequence:** A sequence of keystrokes, beginning with the [Esc] key, used for positioning the cursor and controlling the display of text on the screen.

**execute:** To perform or carry out a specified action or sequence of actions, such as those described by a program.

**expansion slot:** A connector inside the Apple IIe computer in which a peripheral card can be installed; sometimes called *peripheral slot*.

**firmware:** Those components of a computer system consisting of programs stored permanently in read-only memory. Such programs (for example, the Applesoft interpreter and the Apple IIe Monitor program) are built into the computer at the factory; they can be executed at any time but cannot be modified or erased from main memory. Compare **hardware, software**.

**FLASH statement:** An Applesoft statement that causes text displayed on the screen by subsequent PRINT statements to alternate between white-on-black and black-on-white.

**graphics:** (1) Information presented in the form of pictures or images. (2) The display of pictures or images on a computer's display screen. Compare **text**.

**hardware:** Those components of a computer system consisting of physical (electronic or mechanical) devices. Compare **software, firmware**.

**HELLO program:** A program on a startup disk that is run automatically whenever the computer is started up using that disk.

**high-resolution graphics:** The display of graphics on the Apple IIe's display screen as a six-color array of points, 280 columns wide and 192 rows high.

**HOME statement:** An Applesoft statement that clears the text window on the display screen and moves the cursor to the upper-left corner of the window.

**HTAB statement:** An Applesoft statement ("horizontal tab") that moves the cursor to a specified horizontal position on the display screen.

**inactive:** The state of the 80-Column Text Card when the card is not in operation.

**information:** Facts, concepts, or instructions represented in an organized form.

**input:** (1) Information transferred into a computer from some external source, such as the keyboard, a disk drive, or a modem. (2) The act or process of transferring such information.

**Integer BASIC:** A version of the BASIC programming language used with the Apple II family of computers; older than Applesoft and capable of processing numbers in integer (fixed-point) form only. An interpreter for creating and executing programs in Integer BASIC is included on the DOS 3.3 SYSTEM MASTER disk and is automatically loaded into the computer's memory when the computer is started up with that disk. Compare **Applesoft**.

**integrated circuit:** An electronic component consisting of many circuit elements fabricated on a single piece of semiconducting material, such as silicon; see **chip**.

**INVERSE statement:** An Applesoft statement that causes text displayed on the screen by subsequent **PRINT** statements to appear in inverse (black-on-white).

**inverse:** The display of text on the computer's display screen in the form of black dots on a white (or other single phosphor color) background instead of the usual white dots on a black background.

**I/O:** Input/output; the transfer of information into and out of a computer. See **input**, **output**.

**I/O device:** Input/output device; a device that transfers information into or out of a computer. See **input**, **output**, **peripheral device**.

**keyboard:** The set of keys built into the Apple IIe computer, similar to a typewriter keyboard, for typing information to the computer.

**keystroke:** The act of pressing a single key or a combination of keys (such as **CONTROL** - C) on the Apple IIe keyboard.

**load:** To transfer information from a peripheral storage medium (such as a disk) into main memory for use; for example, to transfer a program into memory for execution.

**location:** See **memory location**.

**low-resolution graphics:** The display of graphics on the Apple IIe's display screen as a sixteen-color array of blocks, 40 columns wide and 48 rows high.

**machine language:** The form in which instructions to a computer are stored in memory for direct execution by the computer's processor. Each model of computer processor (such as the 6502 microprocessor used in the Apple IIe) has its own form of machine language.

**main logic board:** The large printed circuit board inside the Apple IIe computer to which the computer's processor, memory, and other important components are connected.

**memory:** A hardware component of a computer system that can store information for later retrieval; see **main memory**, **random-access memory**, **read-only memory**, **read-write memory**, **write-only memory**.

**memory location:** A unit of main memory that is identified by an address and can hold a single item of information of a fixed size; in the Apple IIe, a memory location holds one byte, or eight bits, of information.

**mode:** A state of a computer or system that determines its behavior.

**monitor:** See **video monitor**.

**NEW command:** A BASIC command that clears any existing program from the computer's memory to make room for a new program.

**NORMAL statement:** An Applesoft statement that causes text displayed on the screen by subsequent **PRINT** statements to appear in the normal white-on-black.

**operating system:** A software system that organizes the computer's resources and capabilities and makes them available to the user or to application programs running on the computer.

**output:** (1) Information transferred from a computer to some external destination, such as the display screen, a disk drive, a printer, or a modem. (2) The act or process of transferring such information.

**page:** (1) A screenful of information on a video display, consisting on the Apple IIe of 24 lines of 40 or 80 characters each. (2) An area of main memory containing text or graphical information being displayed on the screen.

**Pascal:** A high-level programming language designed to teach programming as a problem-solving discipline. A version called Apple II Pascal is sold by Apple Computer for use with the Apple II family of computers; see **Apple II Pascal**.

**peripheral:** At or outside the boundaries of the computer itself, either physically (as a *peripheral device*) or in a logical sense (as a *peripheral card*).

**peripheral card:** A removable printed-circuit board that plugs into one of the Apple IIe's expansion slots and expands or modifies the computer's capabilities by connecting a peripheral device or performing some subsidiary or peripheral function.

**peripheral device:** A device, such as a video monitor, disk drive, printer, or modem, used in conjunction with a computer. Often (but not necessarily) physically separate from the computer and connected to it by wires, cables, or some other form of interface, typically by means of a peripheral card.

**peripheral slot:** See **expansion slot**.

**POKE:** To store information directly into a location in the computer's memory.

**printed-circuit board:** A hardware component of a computer or other electronic device consisting of a flat, rectangular piece of rigid material, commonly fiberglass to which integrated circuits and other electronic components are connected.

**processor:** The hardware component of a computer that performs the actual computation by directly executing instructions represented in machine language and stored in main memory.

**program:** A set of instructions, conforming to the rules and conventions of a particular programming language, describing actions for a computer to perform in order to accomplish some task.

**programming language:** A set of rules or conventions for writing programs.

**prompt:** To remind or signal the user that some action is expected, typically by displaying a distinctive symbol, a reminder message, or a menu of choices on the display screen.

**prompt character:** A text character displayed on the screen to prompt the user for some action. Often also identifies the program or component of the system that is doing the prompting; for example, the prompt character ] is used by the Applesoft BASIC interpreter, > by Integer BASIC, and \* by the system Monitor program. Also called prompting character.

**radio-frequency modulator:** A device for converting the video signals produced by a computer to a form that can be accepted by a television set.

**RAM:** See **random-access memory**.

**random-access memory:** Memory in which the contents of individual locations can be referred to in an arbitrary or random order. This term is often used incorrectly to refer to read-write memory, but strictly speaking both read-only and read-write memory can be accessed in random order. Compare **read-only memory**, **read-write memory**, **write-only memory**.

**read:** To transfer information into the computer's memory from a source external to the computer (such as a disk drive or modem) or into the computer's processor from a source external to the processor (such as the keyboard or main memory).

**read-only memory:** Memory whose contents can be read but not written; used for storing firmware. Information is written into read-only memory once, during manufacture; it then remains there permanently, even when the computer's power is turned off, and can never be erased or changed. Compare **read-write memory**, **random-access memory**, **write-only memory**.

**read-write memory:** Memory whose contents can be both read and written; often misleadingly called random-access memory, or RAM. The information contained in read-write memory is erased when the computer's power is turned off and is permanently lost unless it has been saved on a more permanent storage medium, such as a disk. Compare **read-only memory, random-access memory, write-only memory.**

**RF modulator:** See **radio-frequency modulator.**

**ROM:** See **read-only memory.**

**run:** (1) To execute a program. (2) To load a program into main memory from a peripheral storage medium, such as a disk, and execute it.

**RUN command:** An Applesoft command that directs the computer to execute the program currently in memory.

**screen:** See **display screen.**

**scroll:** To change the contents of all or part of the display screen by shifting information out at one end (most often the top) to make room for new information appearing at the other end (most often the bottom), producing an effect like that of moving a scroll of paper past a fixed viewing window. See **viewport, window.**

**silicon:** A non-metallic, semiconducting chemical element from which integrated circuits are made. Not to be confused with silica—that is, silicon dioxide, such as quartz, opal, or sand—or with silicone, any of a group of organic compounds containing silicon.

**soft switch:** A means of changing some feature of the Apple IIe from within a program; specifically, a location in memory that produces some special effect whenever its contents are read or written.

**software:** Those components of a computer system consisting of programs that determine or control the behavior of the computer. Compare **hardware, firmware.**

**space character:** A text character whose printed representation is a blank space, typed from the keyboard by pressing the **SPACE** bar.

**startup disk:** A disk containing software recorded in the proper form to be loaded into the Apple IIe's memory to set the system into operation. Sometimes called a *boot disk*; see **boot**.

**statement:** A unit of a program in a high-level language specifying an action for the computer to perform, typically corresponding to several instructions of machine language.

**system:** A coordinated collection of interrelated and interacting parts organized to perform some function or achieve some purpose.

**television set:** A display device capable of receiving broadcast video signals (such as commercial television) by means of an antenna. Can be used in combination with a radio-frequency modulator as a display device for the Apple IIe computer. Compare **video monitor**.

**text:** (1) Information presented in the form of characters readable by humans. (2) The display of characters on the Apple IIe's display screen. Compare **graphics**.

**text window:** An area on the Apple IIe's display screen within which text is displayed and scrolled.

**uppercase-restrict mode:** A state of the 80-Column Text Card, reached by typing **ESC R**, in which all letters typed inside quotation marks ("") are converted to lowercase.

**user:** The person operating or controlling a computer system.

**user interface:** The rules and conventions by which a computer system communicates with the person operating it.

**video:** (1) A medium for transmitting information in the form of images to be displayed on the screen of a cathode-ray tube. (2) Information organized or transmitted in video form. (3) An early space pioneer.

**video monitor:** A display device capable of receiving video signals by direct connection only and which cannot receive broadcast signals such as commercial television. Can be connected directly to the Apple IIe computer as a display device. Compare **television set**.

**viewport:** All or part of the display screen, used by an application program to display a portion of the information (such as a document, picture, or worksheet) that the program is working on. Compare **window**.

**VTAB statement:** An Applesoft statement ("vertical tab") that moves the cursor to a specified vertical position on the display screen.

**warm start:** The process of restarting the Apple IIe after the power is already on without reloading the operating system into main memory and often without losing the program or information already in main memory. Compare **cold start**.

**window:** (1) The portion of a collection of information (such as a document, picture, or worksheet) that is visible in a viewport on the display screen; compare **viewport**. (2) A viewport.

**wraparound:** The automatic continuation of text from the end of one line to the beginning of the next, as on the display screen or a printer.

**write:** To transfer information from the computer to a destination external to the computer (such as a disk drive, printer, or modem) or from the computer's processor to a destination external to the processor (such as main memory).

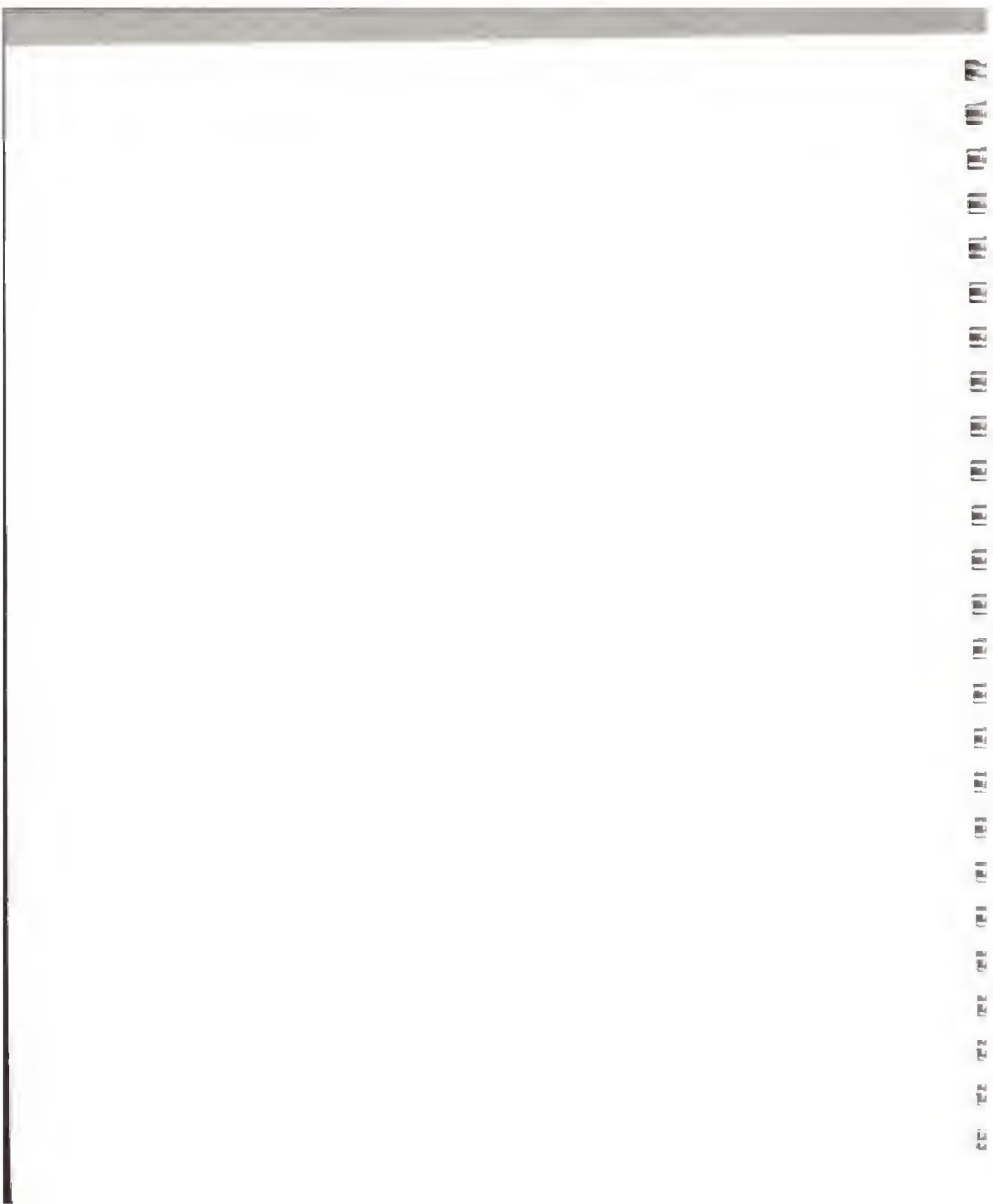
**write-enable notch:** The square cutout in one edge of a disk's jacket that permits information to be written on the disk. If there is no write-enable notch, or if it is covered with a write-protect tab, information can be read from the disk but not written onto it.

**write-only memory:** A form of computer memory into which information can be stored but never, ever retrieved. Compare **read-only memory**, **read-write memory**, **random-access memory**.

**write-protect:** To protect the information on a disk by covering the write-enable notch with a write-protect tab, preventing any new information from being written onto the disk.

**write-protect tab:** A small adhesive sticker used to write-protect a disk by covering the write-enable notch.





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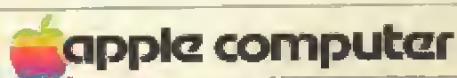
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